A photograph of the Aurora Borealis (Northern Lights) over a calm lake at night. The aurora is a vibrant green, arching across the dark sky, which is filled with stars. The lights are reflected in the still water of the lake. The horizon is dark, with some silhouettes of trees and a small cloud. The overall scene is serene and majestic.

# Auroral Precipitation Models: A Potential Future Topic for GGCM Metrics and Validation

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**All of you – the Audience**

Image taken by Zoltan Kenwell  
3 May 2010, Near St. Paul, Alberta, Canada

# Existing Models

- Hardy model
- Ovation model – Newell et al.

CCMC is collaborating with AFWA in validating both of them (Hardy and Ovation).

- Ovation Prime – Newell et al. (running at CCMC, run-on-request soon)
- Zhang and Paxton Auroral Model
- Combining a Global MHD and an inner magnetosphere model to determine the boundaries (one already running at CCMC)
- ....

# Data for Validation

- DMSP particle data (not for the models which are based on the DMSP data)

- Auroral imaging data

IMAGE/FUV, May 2000-Dec, 2005 [Stephen Mende](#)/[Harald Frey](#)

POLAR/UVI, March, 1996-1999, 2007 [Kan Liou](#)

DMSP/SUSSI, 2005 – present [Larry Paxton](#)/[Yongliang Zhang](#)

TIMED/GUVI Feb. 2002 –Nov 2007 [Larry Paxton](#)/[Yongliang Zhang](#)

- Other data

Particle data (local, better determination of boundaries) versus Imaging data (global, but compromises in boundary determination?) need both!

# Potential events for contemplation

- One Quiet time
- One during Steady Magnetospheric Convection (SMC) period
- One during active substorm period
- One during superstorm time

Working with experts in selecting events. But we'd like to hear your suggestions as well.

# Results from Ovation Prime

## Four Types

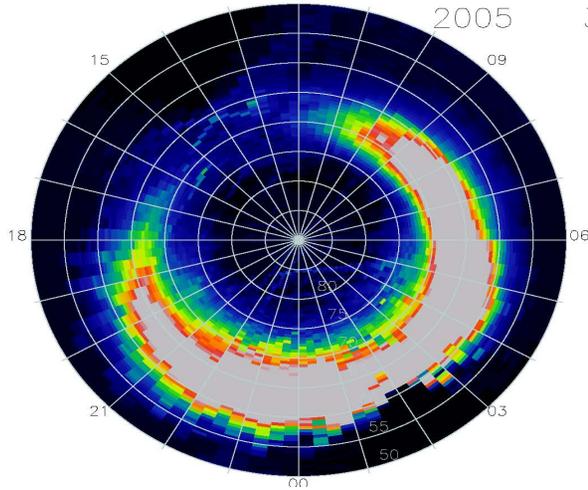
diff2010 095 54000

Diffusive

33.4 GW

1984 1  
2005 365

ergs/cm2s



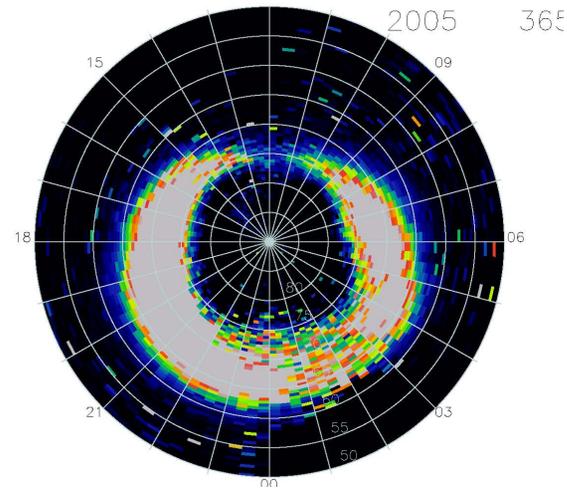
mono2010 095 54000

Monoenergetic

16.8 GW

1984 1  
2005 365

ergs/cm2s



5 April 2010 @ 1500 UT

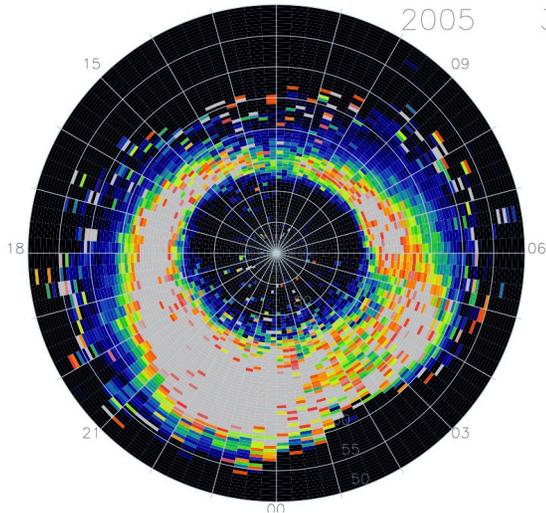
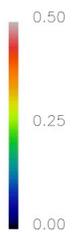
wave2010 095 54000

Wave

10.6 GW

1984 1  
2005 365

ergs/cm2s



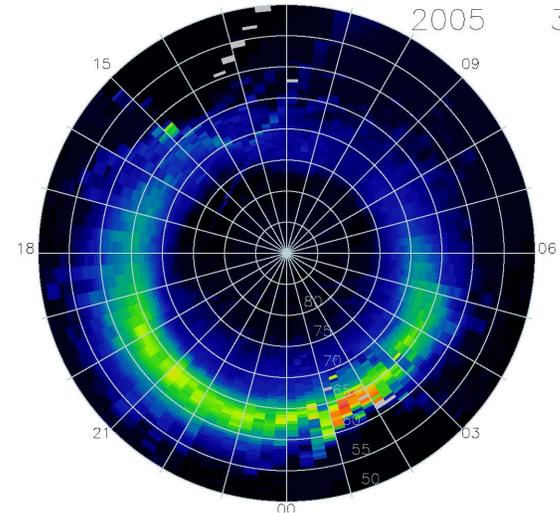
ions2010 095 54000

Ion Precipitation

7.3 GW

1984 1  
2005 365

ergs/cm2s



# Results from Ovation Prime

## Sum of all four types

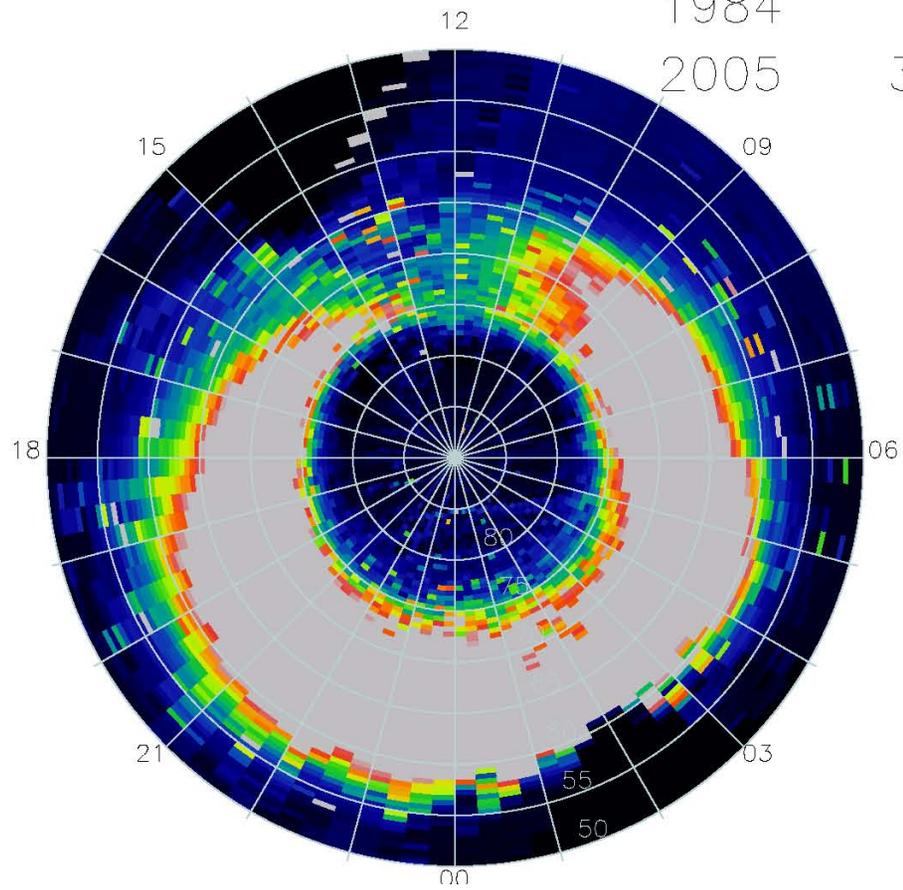
dIII2010 095 54000

67.3 GW

1984 1

2005 365

ergs/cm2s



# Auroral boundaries from CCMC models

06/21/2010 Time = 08:24:00

## Northern Hemisphere

